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GB 1855455

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Selected US specifications from IPC sub-class F04B

## (54) Dispenser guns

(57) A dispenser gun having a rod-advancing mechanism of the tilting gripper kind employs a rod (4) of circular cross-section and a gripper (12) having a circular hole (21) through which the rod slides. The gripper has, indentations (25,28; 31,32) having a generally arcuate base and running into the hole (21). The gripper when tilted grips the rod firmly without marking the rod.

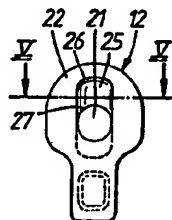


FIG. 2

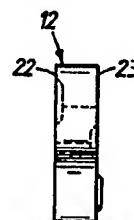


FIG. 3

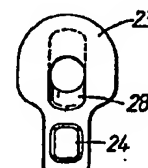


FIG. 4

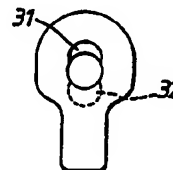


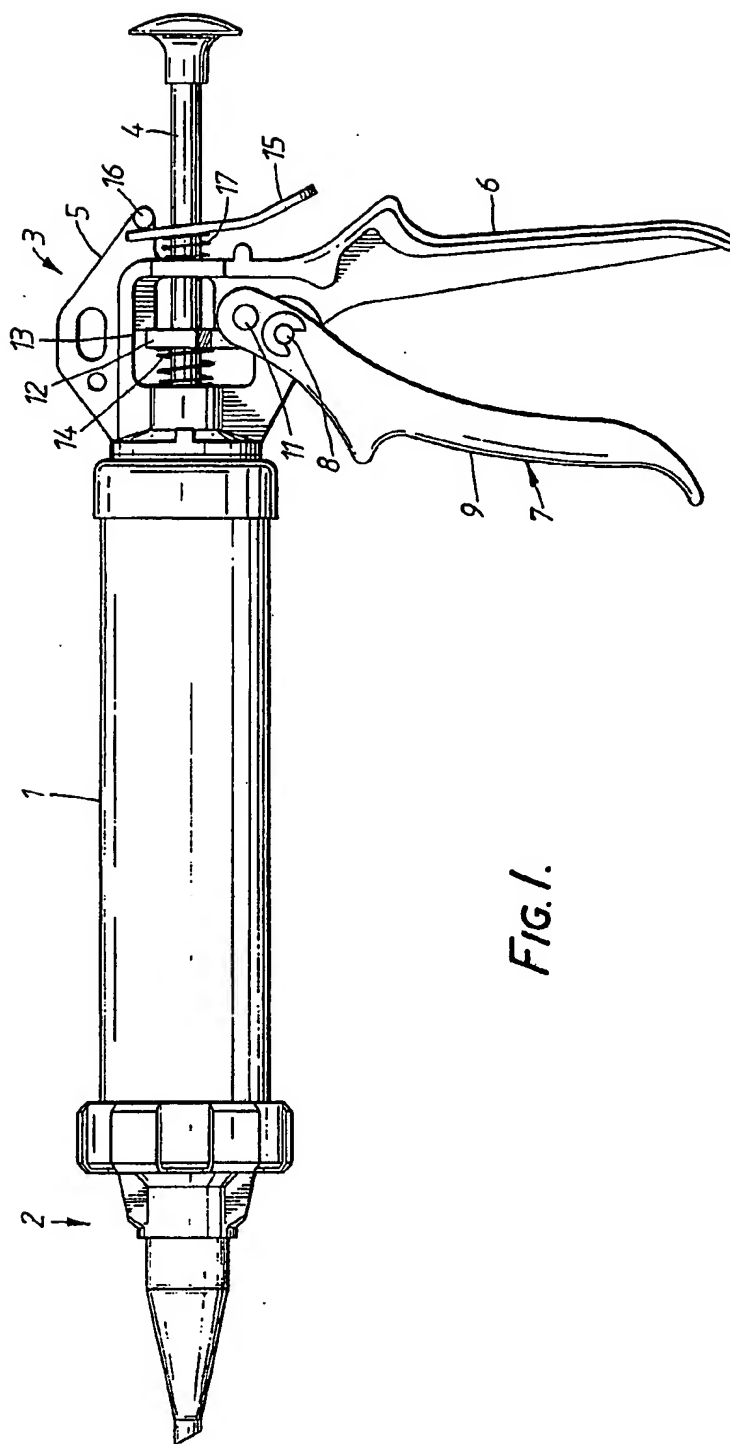
FIG. 6

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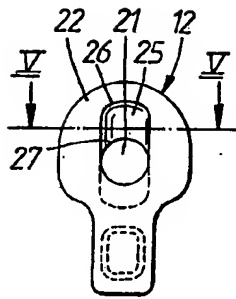


FIG. 2.

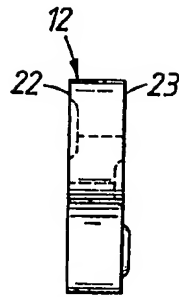


FIG. 3.

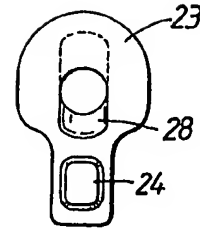


FIG. 4.

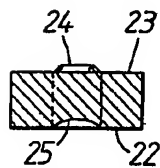


FIG. 5.

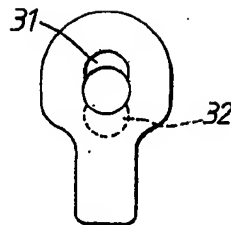


FIG. 6.

## SPECIFICATION

### Rod advancing mechanisms

5 This invention relates to rod advancing mechanisms of the kind including a one-way gripper arranged for reciprocation longitudinally of the axis of the rod and arranged to tilt relative to the axis of the rod between a rod-gripping position on the forward stroke of reciprocation of the gripper to advance the rod and a rod-release position on the rearward stroke of reciprocation of the gripper to allow the gripper to return without moving the rod. Such mechanisms may be used for various purposes such as window and door stays and lifting jacks but one particular application is to dispensers for viscous materials which may be of a thick liquid nature or a pasty nature, for example mastic caulking materials. Various constructions of dispensers for viscous materials are known and one particular example is described in GB-1264311A. This describes a gun for expressing liquid or semi-liquid substances including a body, a rod mounted on the body for axial movement thereon, and a movable oneway gripper mounted on the body and arranged to advance the rod in the manner described above. In the majority of such guns the rod is of circular cross section and the gripper has a circular aperture through which the rod passes fairly freely. When the gripper is tilted to the gripping position there is, theoretically, only point contact at two places between the gripper and the rod, one place being on one side of the gripper at a point on the rod which is diametrically opposite to the first point and displaced along the rod axially. In practice it is found that, if the geometry is so arranged that there is adequate engagement between the gripper and the rod for a sufficient force to be transmitted from the gripper to the rod to express highly viscous material without the gripper slipping along the rod when it is in the rod gripping position, substantial scoring of the rod occurs. Such scoring inhibits the smooth return movement during which it is necessary for the rod to slide through the gripper freely.

50 According to one aspect of the present invention, a rod advancing mechanism of the construction set out above has a parallel-sided rod of circular cross-section and a gripper plate with a parallel-sided hole of circular cross section, through which the rod passes, the mouth of the hole on one side of the gripper being bounded around at least part of its periphery by an arc of an ellipse, the geometry being such that on tilting of the plate the elliptical arc engages the rod along a substantial length. This may be achieved, with a parallel-sided gripper by providing, on the said side of the gripper, an indentation having a generally arcuate base and running into the hole to provide an edge to the hole on the

said one side of the gripper which is formed of two arcuate portions, one formed by the intersection of the hole and one face of the gripper and the other formed by the intersection of the base of the indentation with the hole.

Preferably, there is a similar arc of an ellipse on the other side of the gripper plate. Thus, where the gripper plate is parallel-sided there may be a similar indentation on the other side of the gripper and positioned diametrically opposite to the first indentation.

It has been found that with such arrangements a very large force can be transmitted between the gripper plate and the rod without the gripper plate slipping on the rod and without any substantial scoring of the rod. The effect is to provide an edge on the gripper plate which, when the gripper is very slightly tilted, engages the rod over a substantial arc. It is found that adequate gripping can be achieved with the gripper tilting through only a very small angle relative to the rod while the difference in diameters between the rod and the hole through which it passes can be kept very small. It is found that little or no scarring of the rod occurs even with the transfer of considerable forces. However, the situation can be yet further improved by making the rod of mild steel and hardening a thin surface layer thereof, for example by passing the rod through an induction furnace and rapidly cooling it, for example in an oil bath.

The or each indentation where provided may be a parallel-sided groove running into the hole or alternatively may be a part dome-shaped depression which overlaps the hole. Preferably the width of the indentation is approximately equal to the diameter of the hole.

The gripper is preferably made of metal by a sintering process but may be produced in other ways, for example by lost wax casting. The gripper may have a thickness which is approximately equal to the diameter of the hole.

According to another aspect of the present invention, a gun for expressing liquid or semi-liquid substances of the construction set out above has a parallel-sided gripper plate with a parallel-sided hole of circular cross-section, and on one side of the gripper an indentation having a generally arcuate base and running into the hole to provide an edge to the hole on the said one side of the gripper which is formed of two arcuate portions, one formed by the intersection of the hole and one face of the gripper and the other formed by the intersection of the base of the indentation with the hole, the rod being parallel-sided and of circular cross section and being a sliding fit in the hole.

The invention may be carried into practice in various way but one dispensing device for viscous materials and embodying the invention will now be described by way of example to-

gether with a modified gripper. These will be described with reference to the accompanying drawings in which:

- Figure 1 is a side elevation of the dispenser;
- Figure 2 is a rear elevation of the gripper of the dispenser shown in Figure 1;
- Figure 3 is a side elevation of the gripper;
- Figure 4 is a rear elevation of the gripper;
- Figure 5 is a cross section on the plane V-V in Figure 2; and

Figure 6 is a view similar to Figure 2 of a modified construction of gripper.

- The dispenser shown in the drawings, and particularly in Figure 1, comprises a barrel 1 to contain the material to be dispensed and having at one end a nozzle assembly 2 and at the other end an operating mechanism 3 by means of which a piston rod 4 can be advanced step by step along the axis of the barrel 1. The operating mechanism comprises a body portion 5 having a depending stock 6 which can be grasped in the hand and to which is pivoted a trigger-like member 7. On the side of the pivot 8 of the trigger member 7 remote from the finger-engaging portion 9 thereof is a stud 11 which engages an apertured plate 12 through the aperture in which the piston rod 4 passes with some clearance. The upper edge of the plate 12 rests against a shoulder 13 on the body portion 5 and the plate 12 is biased to the right as seen in the drawing by means of a compression spring 14. The piston rod also passes through a second apertured plate 15 which engages against a boss 16 on the body 5 and which is biased to the right as seen in the drawing by means of a compression spring 17. Although the mode of operation of such a mechanism is well known in this art it will be briefly described. When the trigger member 7 is squeezed in the hand towards the stock 6 the stud 11 tilts the plate 12 about its point of engagement with the abutment 13 until the upper and lower extremities of the aperture in the plate grip the upper and lower surfaces of the piston rod 4. On continued backward movement of the trigger member 7, the plate 12 moves forward with the piston rod to advance the piston in the barrel 1. During this forward movement of the piston rod 4, the rod slides through the plate 15 which is tilted slightly about the stud 16 to allow free movement of the rod 4 through the aperture of the plate. On release of the trigger member 7, the spring 14 returns the plate 12 to the position shown in Figure 1, the plate sliding along the rod 4 which is prevented from moving in the reverse direction by the plate 15 resuming the position shown in Figure 1 and gripping the rod 4. The return movement of the plate 12 under the action of the spring 14 also returns the trigger member 7 to the position shown.

- Reference will now be made to Figures 2 and 3 which show the gripper member or plate 12 in greater detail.

- The gripper 12 is shown in greater detail in Figures 2 to 5 and it will be seen that it consists of a generally key-hole shaped thick plate which is made of sintered metal and in the broad part has a cylindrical hole 21 extending through it from the rear face 22 to the front face 23, the axis of the hole being normal to the two surfaces. On the narrow part of the front face 23 there is a boss 24 whose sole purpose is to identify the front face from the rear face to ensure that the gripper is assembled the correct way round. The rear face 22 is formed with a shallow groove 25 whose width is equal to the diameter of the hole 21 and which has a base which is an arc of a circle. The groove extends from a closed end 26 and runs into the hole 21 thus providing an intersection between the groove 25 and the hole 21 which is in the form of a non-circular arc 27. The front face 23 is formed with a groove 28 which is of identical form but which runs into the bottom of the hole 21 by comparison with the groove 25 on the rear face which runs into the top of the hole.

- When the gripper 12 is mounted on the rod 4 which is a sliding fit therein (the term sliding being here used in its general and everyday sense of a fairly close but free moving fit rather than in its technically defined sense) force applied to the lower part of the gripper by the pin 11 will cause the gripper to tilt very slightly so that the curved edge 27 at the intersection between the groove 25 and the hole 21 above the rod and the intersection between the groove 28 and the hole 21 below the rod at the front of the gripper will engage the rod and these sharp edges will grip the rod 4 not at a point but over an arc. Accordingly the rod 4 is firmly gripped and considerable force can be applied to the trigger member 7 and hence through the pin 11 and a plate 12 to the rod 4 and hence to the piston in the barrel 1, thus increasing pressure on the contents in the barrel and causing it to be expressed through the nozzle 2.

- In the modification shown in Figure 6 the grooves 25 and 28 are replaced by dimples 31 and 32 which are of part spherical form.

#### CLAIMS

1. A rod-advancing mechanism comprising a parallel-sided rod of circular cross-section and a gripper plate with a parallel-sided hole of circular cross-section through which the rod passes, the mouth of the hole on one side of the gripper being bounded around at least part of its periphery by an arc of an ellipse, the geometry being such that on tilting of the plate the elliptical arc engages the rod along a substantial length.

2. A mechanism as claimed in claim 1 in which the gripper is parallel-sided and there is, on one side of the gripper, an indentation having a generally arcuate base and running into

the hole to provide an edge to the hole on the said one side of the gripper which is formed of two arcuate portions, one formed by the intersection of the hole and one face of the gripper and the other formed by the intersection of the base of the indentation with the hole.

3. A mechanism as claimed in claim 1 or claim 2 in which there is a similar arc on the other side of the gripper plate.

4. A mechanism as claimed in claim 3 when appendent to claim 2 in which the similar arc is provided by a similar indentation on the other side of the gripper and positioned diametrically opposite to the first indentation.

5. A mechanism as claimed in any of claims 1 to 4 in which the rod is of mild steel with a hardened surface layer.

6. A gun for expressing liquid or semi-liquid substances having a body, a parallel-sided rod of circular cross-section through which the rod passes, the gripper plate being mounted on the body and arranged for reciprocation longitudinally of the axis of the rod and arranged to tilt relative to the axis of the rod between a rod-gripping position on the forward stroke of reciprocation of the gripper to advance the rod and a rod-release position on the rearward stroke of reciprocation of the gripper to allow the gripper to return without moving the rod, and on one side of the gripper an indentation having a generally arcuate base and running into the hole to provide an edge to the hole on the said one side of the gripper which is formed of two arcuate portions, one formed by the intersection of the hole and one face of the gripper and the other formed by the intersection of the base of the indentation with the hole.

7. A gun as claimed in claim 6 in which there is a similar indentation on the other side of the gripper and positioned diametrically opposite to the first indentation.

8. A gun as claimed in claim 6 or claim 7 in which the rod is of mild steel with a hardened surface layer.

9. A mechanism as claimed in any of claims 1 to 5 or a gun as claimed in claim 6 or claim 7 or claim 8 in which the gripper plate is of sintered metal.

10. A rod advancing mechanism substantially as described with reference to the accompanying drawings.

11. A gun substantially as specifically described herein with reference to the accompanying drawings.

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